

INTERVIEW

—Research & development



Taming the Cavendish's wild relatives

WAGENINGEN—Using genetic traits from the Cavendish variety's wild relatives forms the basis of Plant Research International's search for a Panama disease-resistant banana variety.

by John Hey

With the banana industry in the Philippines troubled by the threat of disease, ASIAFRUIT talks to Dr Gert Kema of Plant Research International about the institute's exciting work in developing disease-resistant cisgenic banana varieties.

Can you tell us about your efforts to develop a cisgenic banana variety that uses resistance genes from other wild banana varieties to transform the Cavendish banana? How soon do you think it could be before a disease-resistant variety is found?

Gert Kema: It will not take long to find a resistant banana – likely several months to a year. In fact, we already have one, the *Musa acuminata* subspecies *malaccensis* (Pahang). Interestingly, this is the genotype that was sequenced – the genome sequence will be available very soon. We discovered the resistance of Pahang in our phenotyping work last year. Whereas the majority of banana varieties are extremely susceptible to *Fusarium*

oxysporum f.sp. cubense (Foc) tropical race 4, Pahang had an extremely high level of quantitative resistance. I'm convinced that we will find more resistant wild germplasm in future screening work, which is part of the recently launched INREF programme, an initiative from Wageningen University aimed at the management of Foc.

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Last year, a researcher from the University of Queensland began the first field tests of a genetically modified Cavendish, which he hopes will provide long-term resistance against Foc, the virulent strain of Panama disease. GM is often considered the only way to breed Cavendish since the variety is completely sterile. We understand that cisgenesis is a type of GM but different from conventional forms of GM. Can you explain the difference?

GK: Cisgenesis strictly uses genes from wild relatives, whereas transgenics exploit genes from various other plant species (or even animals) that normally would never hybridize with the target species. In the Caven-

dish+ approach, we combine the wealth of genetic diversity in wild bananas with safe and sound gene transfer technology (no incorporation of antibiotics genes or other non-banana DNA). The end result is generally even better than in classical breeding as we modify an adapted cultivar that meets all market and stakeholder requirements.

Most banana researchers say the answer to the Panama disease problem is to abandon the monoculture that makes its emergence so devastating – a more diverse banana harvest would allow farmers to isolate susceptible bananas and surround them with more resistant varieties. What is your view on this? Can the Philippines use its range of other varieties to help fight Panama disease?

GK: This is very true. Monocultures – and certainly a global one like Cavendish bananas – are, from the phytosanitary point of view, a drama. Once there is a problem it can spread rapidly around the globe – see for instance the problems with the Black Sigatoka disease fungus *Mycosphaerella fijiensis* that is airborne. However, diversity relies strongly on breeding programmes. Compared to wheat and potatoes, with hundreds of breeding programmes around the world, the five programmes for bananas will never be able to meet such demands. Therefore, cisgenic bananas are truly a very reasonable alternative. In fact, we would eventually be able to release Panama disease-resistant Gros Michel bananas for production in Central America. As such, cisgenesis is virtually the only way ahead towards diversity and to end monocultures. **A**

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 ABOVE—Gert Kema, Plant Research International

REPORT

—Research & development

A fresh approach to R&D

WAGENINGEN—Establishing a diverse network of innovators within the global banana trade is one objective of the newly established Fresh Studio Europe.

by Rob Hay



Research and development within the Asian banana industry is often characterised as a cloistered affair, within which there is little knowledge sharing between the multinationals that dominate production.

The creation in 2005 of Fresh Studio Asia, however, has gone some way towards fostering a more open environment in which the industry and scientific community can work together to address some of the pressing issues the trade now faces.

Hanneke Hermans, Fresh Studio Asia's business development manager, tells ASIAFRUIT the organisation was set up as an independent service provider to give technical assistance and innovate within the banana value chain.

Hermans says that, while the organisation has been focused in the past on the Philippines, it has recently established a European office in the Dutch university city of Wageningen with the help of Philip Hansmann and Paul Smits of NEH Philippines. "The aim of starting Fresh Studio Europe is to gain access to a wider and more diverse network of innovators in fresh produce," says Hermans. "By this, we want to build a bridge between the banana industry on the one hand and state-of-the-art academic research institutes and commercial product developers on the other."

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ABOVE RIGHT— Fresh thinking is vital to protect the industry from disease

RIGHT— Production will benefit from future research partnerships



Hermans describes the industry as "traditional and protective", but adds that there is ample scope for shared initiatives. "Concepts like open research, sharing results and cooperating with other companies, research institutes or universities are more than rare in this industry."

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The organisation is undertaking a number of projects including the Musa Radix Fund, which is run in cooperation with Plant Research International of Wageningen University. The aim is to breed a new, cisgenic Cavendish variety resistant to Panama disease (see p18).

Fresh Studio Europe is also keen to foster cooperation among several European crop protection companies to identify and introduce products that eventually lead to pesticide reduction. Exploring state-of-the-art soil analysis and nematode-detection technologies for the early detection of soil-borne diseases, and looking at the feasibility of introducing these to the banana industry, is also on the agenda.

In addition the organisation will launch internship and exchange programmes between agricultural universities in the Netherlands and the banana industry.

NEH Philippines' general manager Jeroen de Hass says that the company has aligned itself with the organisation, and he believes it will play an important role, alongside the Philippine government and the Pilipino Banana Growers and Exporters Association, in addressing the disease threat to the industry in the Philippines.

"We believe that we can overcome these challenges by working together with world-class institutes which have a proven track record in innovating agricultural crops. Wageningen University and Plant Research International are such institutes. They have been working with many crops and were involved in the research of new varieties resistant to diseases and other threats." **A**